PRORG

COORDINATOR

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HUNGARY (ÖMKI)
ITALY (ASSOBIO, CREA, UNIVPM)
POLAND (WULS)
SWITZERLAND (FIBL)
THE NETHERLANDS (WUR)

CORE organic

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Code of Practice for organic processors – findings from the European project Pro Org

Speakers;

Paulina Gawron SGGW University of live Sience Warzsawa

Raffaele Zanoli Universita Politecnica delle Marche

Claudia Meier FIBL CH

Moderation;

Alexander Beck Association of organic food processors AÖL

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COORDINATOR CREA

CORE Organic Cofund – Call 2016

TOPIC 4: Organic food processing concepts and technologies for ensuring food quality, sustainability and consumer confidence

Code of Practice for organic food processing - ProOrg

Starting date: May 2018 **Duration: 36 months**

Objective:
To develop a Code of Practice addressed to organic food processors and labeling organizations with the aim to provide a set of strategies and tools that can help them for making the best choice for careful processing methods and formulations free of additives, while addressing the organic principle, high food quality, low environmental impact and high degree of consumer acceptance.

The Code has to be implemented at operators' level → flexibly adaptable

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Main activities (1)

- **to develop a practical and flexible Code of Practice (CoP)** for processors of organic food and labelling organizations

Composed out of tree elements;

1. Management Guideline for organic processors (MG)
2. Assessment Framework for technologies (AF)
3. Communication Guideline (CG)

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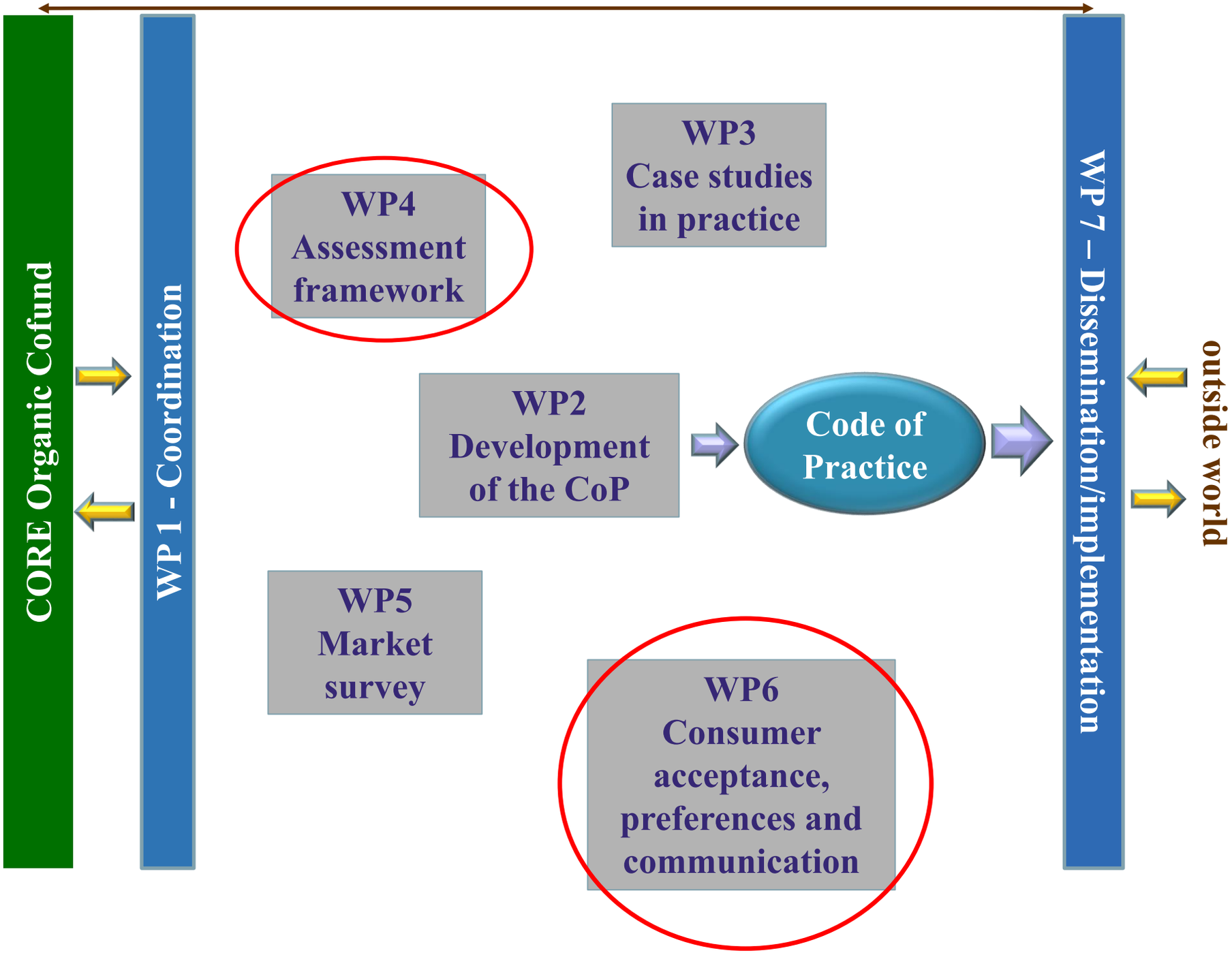

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Part I

Paulina Gawron

SGGW University of live Sience Warsaw

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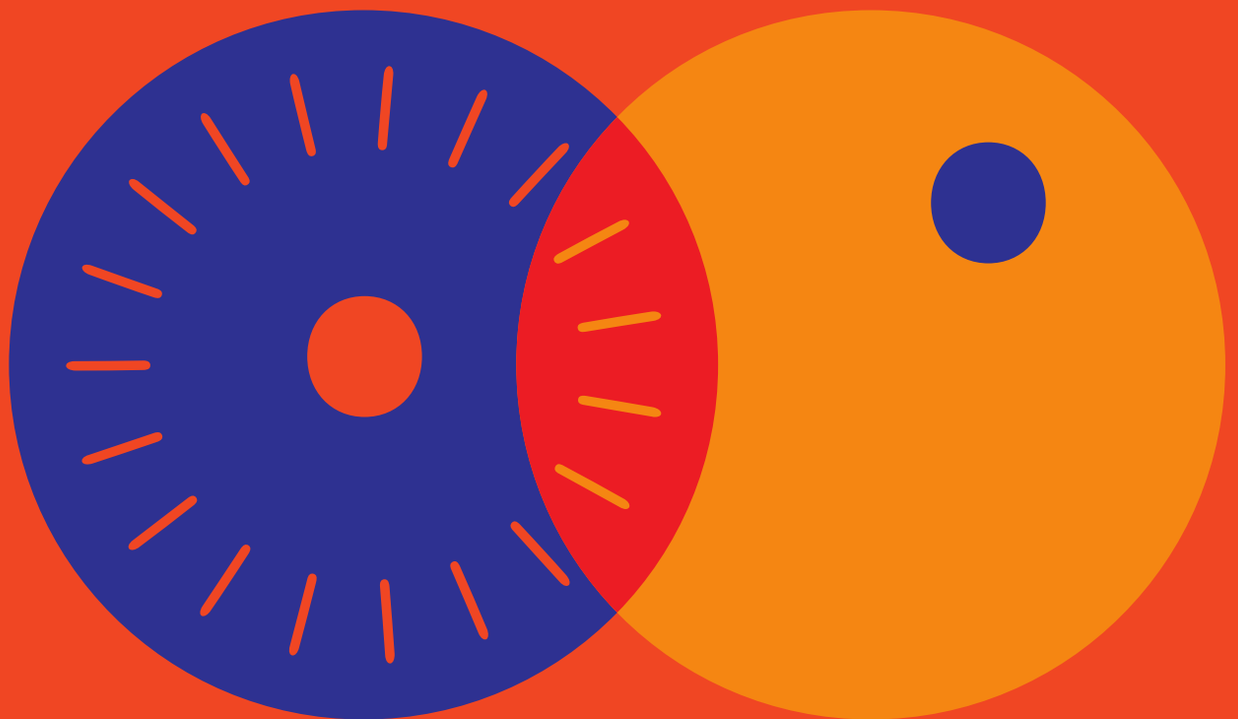
Careful processing - the case of apple juice



Prof. dr hab. Ewa Rembiałkowska
Mgr inż. Karolina Misztal
Mgr inż. Paulina Gawron

Warsaw, 29.01.2021

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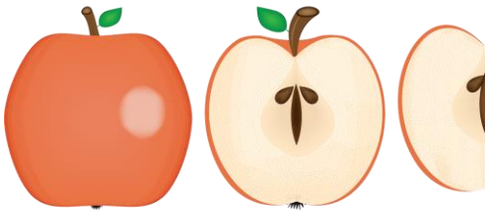
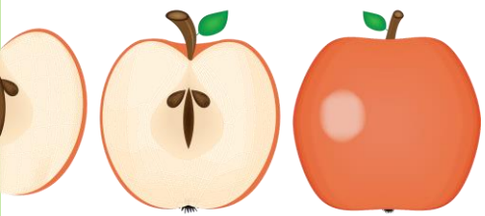


Plan of the presentation:

1. General information
2. Study design
3. Applied methodology
4. Main results
5. Conclusions.



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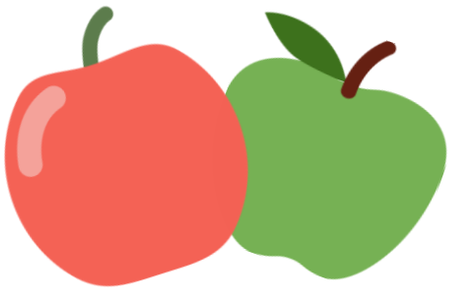
1. General information:



TITLE OF STUDY:

Careful processing - the case of apple juice

OBJECTIVE

The aim of the study was to compare the chemical composition and sensory values of apple juice in dependence on:

- Production system (organic vs conventional apples),
- Processing method (squeezed vs centrifuged juices, gentle pasteurization vs classic pasteurization),
- Processing stage (fresh juice vs pasteurized juice).

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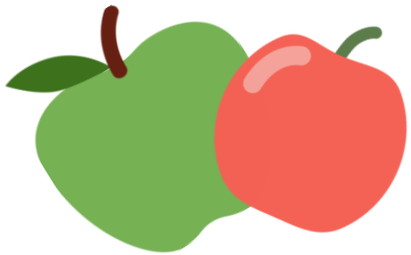
1. General information



PROBLEM

Consumers of organic food are looking for the products with high nutritive value, therefore the processing methods should preserve the highest possible level of bio-compounds in the products. The case of apple juice has been analysed.

SOLUTION

In the ProOrg project we are looking for the best processing methods covering 3 main criteria – high nutritive value, good sensory properties and pro-environmental aspects. We have analysed different methods of the fruit juice production. Some of them are very sophisticated as ultra-high pressure homogenization (UHPH), thermos-sonication or ozone processing. They are not used frequently. The most common methods are **centrifuging** and **squeezing** plus pasteurization. Therefore we have focused on these methods.

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2. Study design

FRESH APPLES 2019

variety 1 *moderately early* ***Szampion***	variety 2 *intermediate* ***Rubinola***	variety 3 *late* ***Pinova***
ORG / CONV	ORG / CONV	ORG / CONV

Apple nutrition value analysis

Chemical composition analyses: dry matter, total sugars, glucose, fructose, sucrose, total organic acids, malic, quinic, citric, vitamin C, dehydroascorbic acid, l-ascorbic acid, total polyphenols, total phenolic acid, gallic, chlorogenic, caffeic, p-coumaric, total flavonoids, catechin, epigallocatechin, quercetin-3-O-rutinoside, kaempferol-3-O-glucoside, luteolin, quercetin, quercetin-3-O-glucoside

Apple sensory analysis

Taste, color, odor (aroma), clarity, overall quality

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APPLE JUICE 2019

variety 1 *moderately early* ***Szampion***	variety 2 *Intermediate* ***Rubinola***	variety 3 *Late* ***Pinova***
ORG / CONV	ORG / CONV	ORG / CONV

APPLE JUICE

SQUEEZED JUICE

- fresh
- gentle pasteurization 55°C / 30 min
- classic pasteurization 95°C / 15 min

CENTRIFUGED JUICE

- fresh
- gentle pasteurization 55°C / 30 min
- classic pasteurization 95°C / 15 min

Apple juice nutrition value analysis

Juice chemical composition analyses: dry matter, total sugars, glucose, fructose, sucrose, total organic acids, malic, quinic, citric, vitamin C, dehydroascorbic acid, l-ascorbic acid, total polyphenols, total phenolic acid, gallic, chlorogenic, caffeic, p-coumaric, total flavonoids, catechin, epigallocatechin, quercetin-3-O-rutinoside, kaempferol-3-O-glucoside, luteolin, quercetin, quercetin-3-O-glucoside

Apple juice sensory analysis

Taste, color, odor (aroma), clarity, overall quality

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4. Main results

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The main effects of, and interactions between, cultivar, agronomic system and processing method on the content of dry matter, sum of sugars, sum of polyphenols, sum of phenolic acids, sum of flavonoids, vitamin C and sum of organic acids in fresh apple juice. Data are presented as means ± standard deviations; values in columns followed by different letters are significantly different at the 5 % level of probability.

	dry matter [1]	sugars (sum) [2]	polyphenols (sum) [3]	phenolic acids (sum) [3]	flavonoids (sum) [3]	vitamin C [3]	organic acids (sum) [2]
Cultivar (CV)							
Pinova	12.1 ± 0.5 b	90.4 ± 7.2 b	143 ± 22 b	121 ± 18 b	21.8 ± 5.8 a	75.6 ± 3.9 b	5.96 ± 0.30 b
Rubinola	13.2 ± 0.3 a	87.2 ± 4.2 b	218 ± 82 a	201 ± 79 a	17.3 ± 3.9 b	87.8 ± 2.9 a	6.22 ± 0.14 a
Szampion	13 ± 1.0 a	97.9 ± 7.8 a	147 ± 31 b	124 ± 26 b	22.7 ± 6.7 a	93.6 ± 12.3 a	6.47 ± 0.48 a
Agronomic System (AS)							
conventional	12.7 ± 0.9	90.7 ± 7.0	156 ± 32	139 ± 32	17.7 ± 3.6	84.0 ± 10.7	6.16 ± 0.38
organic	12.9 ± 0.8	93.0 ± 8.6	182 ± 80	159 ± 80	23.5 ± 6.5	87.4 ± 10.6	6.27 ± 0.40
Processing Method (PM)							
centrifuged	12.4 ± 0.6	87.9 ± 4.5	134 ± 21	117 ± 21	16.9 ± 1.6	81.8 ± 6.9	6.00 ± 0.24
squeezed	13.2 ± 0.8	95.8 ± 8.6	205 ± 68	181 ± 70	24.3 ± 6.4	89.5 ± 12.4	6.43 ± 0.39
ANOVA P-values							
CV	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
AS	NS [4]	NS	NS	NS	0.002	NS	NS
PM	<0.001	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
CV × AS	<0.001	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
CV × PM	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
AS × PM	NS	NS	NS	NS	<0.001	NS	NS
CV × AS × PM	<0.001	0.001	<0.001	<0.001	<0.001	0.031	0.000

[1] g/100g fresh weight; [2] g/L fresh weight; [3] mg/L fresh weight; [4] Not significant.

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Table of juice production efficiency

SQ = squeezing CE = centrifuging

	PINOVA ORG		PINOVA CONV		RUBINOLA ORG		RUBINOLA CONV		SZAMPION ORG		SZAMPION CONV	
	SQ	**CE**	**SQ**	**CE**	**SQ**	**CE**	**SQ**	**CE**	**SQ**	**CE**	**SQ**	**CE**
The final weight of the raw material used for juice (kg)	17,05	16,58	17,95	17,86	11,04	10,85	19,89	19,90	10,26	9,83	12,45	12,61
Mass of pomace (kg)	3,26	6,26	3,50	5,51	2,17	4,05	3,27	8,00	1,99	3,62	2,48	5,02
Juice weight (kg)	13,80	10,29	14,39	12,33	8,87	6,80	16,62	11,90	8,11	5,94	9,80	7,38
Efficiency	**81%**	**62%**	**80%**	**69%**	**80%**	**63%**	**84%**	**60%**	**79%**	**60%**	**79%**	**59%**

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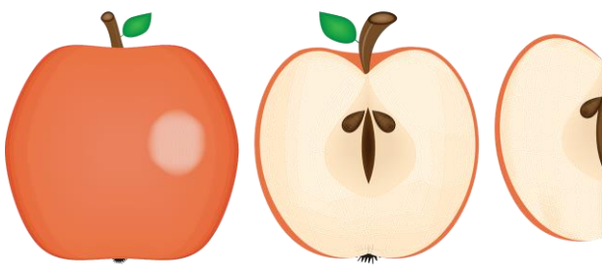
5. Conclusions

- Apple juice contains more phenolic acids when it is prepared by squeezing compared to centrifuging
- Organically produced juices contain more polyphenols, in that more phenolic acids and flavonoids, than conventionally produced juices
- Also the level of total sugars and vitamin C is higher in the organic juices
- To summarize – the nutritional value is higher if the juice is made from the organically grown apples. It is a good argument for the producers to promote their organic products at the market.



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6. Practical recommendations

- Squeezing is a better method of the apple juice production than centrifuging in terms of the nutritional value
- Also the efficiency is higher if squeezing is used compared to centrifuging – economic & environmental aspect

- The practical recommendation for the apple juice producers is to use squeezing as the main method of the juice production
- It is especially important for the organic producers, because they can claim at the label that they use more careful method of processing, improving the health of the consumers & environment.
- High nutritional quality – this should be a motto for the producers.

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Part II

Raffaele Zanoli

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BACKGROUND

- The introduction of innovative food processing technologies to the organic food sector may result in more efficient manufacturing.
- The uncertainty about alternative processing technologies in consumers' minds → lead them to have bias and, misinterpret the organic processed products' labels.
- Consumers may tend to perceive new food processing methods as riskier than conventional food processing methods.
- Negative emotions (anxiety/fear) may influence how consumers perceive and process the information regarding the alternative food technologies.

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OBJECTIVES

- Investigate colour communication schemes for a working definition of “careful processing” for organic consumers
- Analyse how anxiety influence organic consumers’ preferences for organic processed products when careful processing is communicated
- Three studies were preeformed

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Consumer samples

- Each experiment and data collections were carried out through Qualtrics survey software.
- All participants were recruited from Amazon's Mechanical Turk which is an online platform where subjects are paid to perform tasks ranging from sorting images to taking surveys.

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METHODOLOGY

Study 1

- A "careful processing" definition was introduced to 130 participants

"Careful processing refers to methods that aim to:

a) preserve the nutritional and sensory quality of raw materials from organic farming, by limiting the use of additives,

b) minimize the risks for consumer and worker health while promoting fair supply-chains, and

c) limit the impact on the environment by: -reducing *the use of water and energy, - optimizing waste management, and - promoting recyclable/reusable packaging."*

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METHODOLOGY

Study 1

- A “careful processing” definition was introduced to 130 participants
- Video → processing methods: pasteurization, UHT, HPP , PEF , microwave heating, edible film coating, MAP packaging , active packaging.

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METHODOLOGY

Study 1

- A “careful processing” definition was introduced to 130 participants
- Video → processing methods: pasteurization, UHT, HPP , PEF , microwave heating, edible film coating, MAP packaging , active packaging.
- Participants were randomly allocated in two groups with different communication schemes and asked to rank the processing methods according the “careful processing” definition.

Communication Schemes:

Figure 1. *Monochromatic colour based scale*

Figure 2. *Multi-colour based scale*

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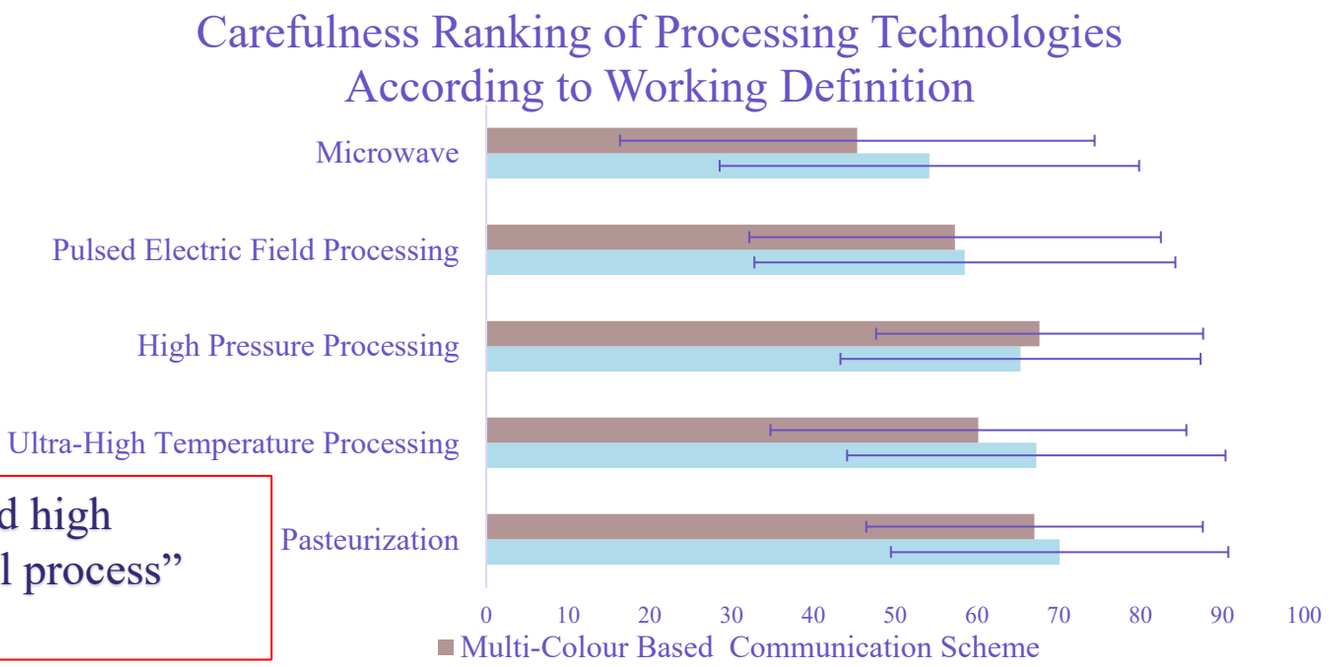
The organic careful processing definition allows to consistently rank the carefulness of different technologies.

88% of respondents were regular organic consumers

Consumers regard pasteurization and high pressure processing as “more careful process” technologies



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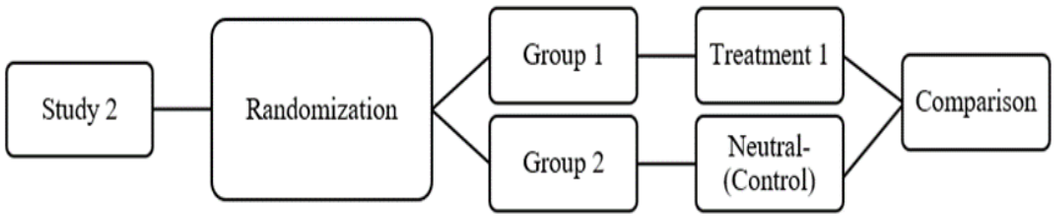
METHODOLOGY

Study 2

- Experimental design:



- Treatment → Video that generates anxiety
- Task: 192 participants were asked to select the prefer processing technology for four products: cow milk, soy milk, apple juice and orange juice.

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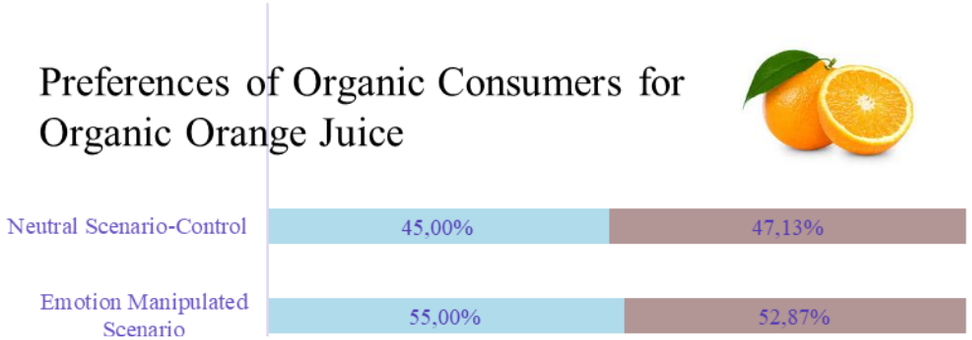
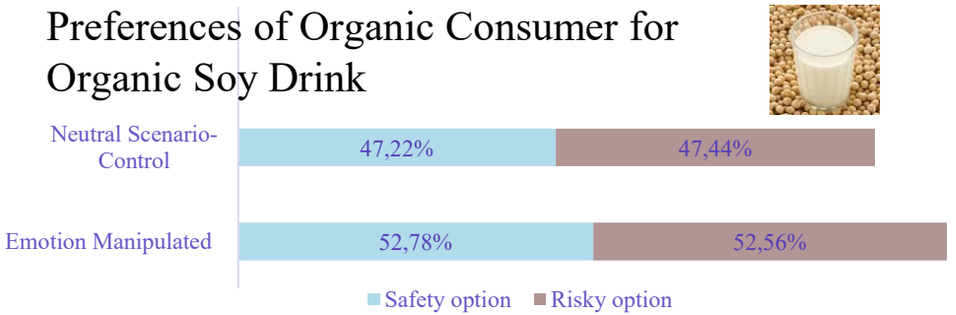
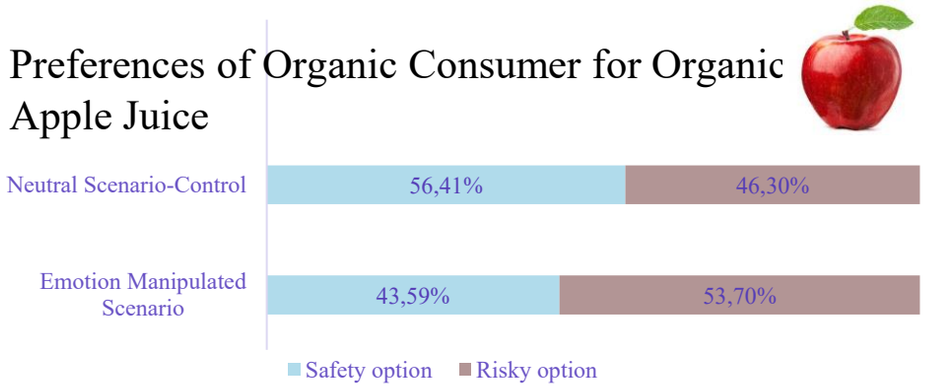
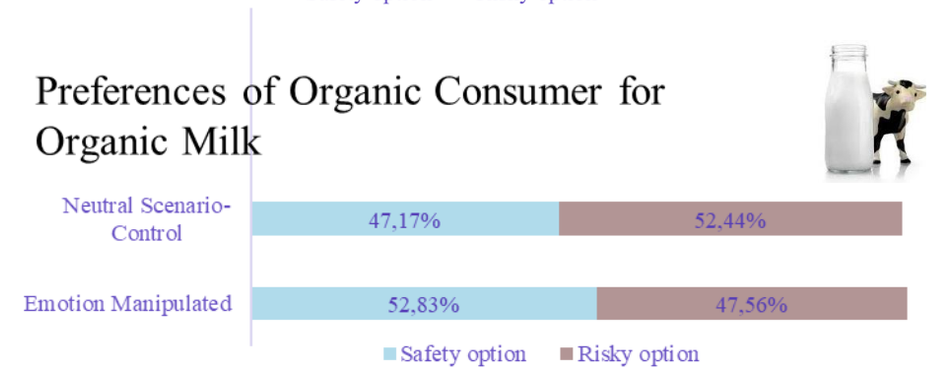
Anxiety does not seem to make differences

Organic is considered by consumers , as safe and less risky, no matter the processing method









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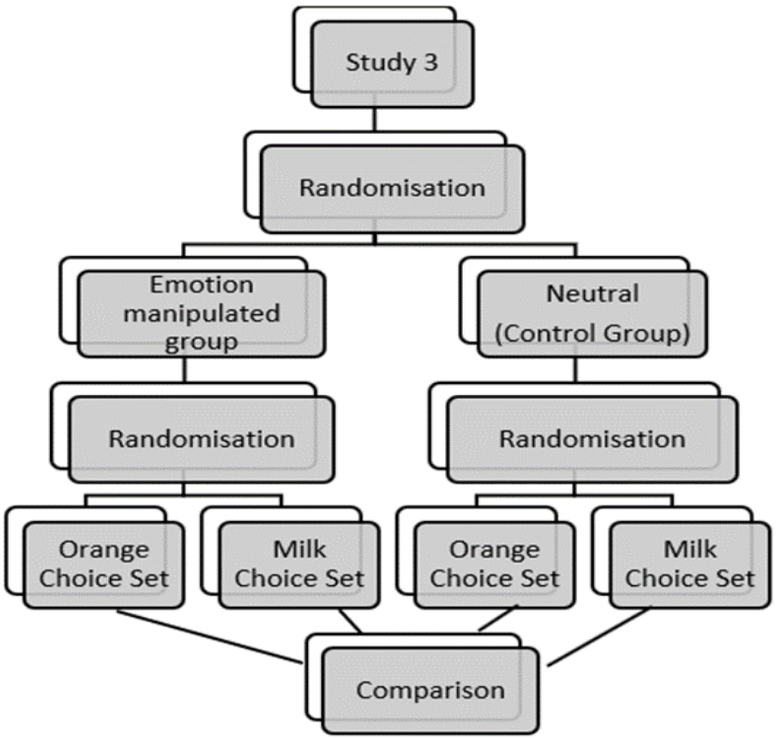
METHODOLOGY

Study 3

- Experimental design



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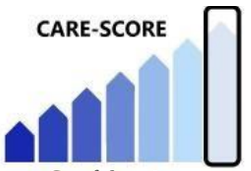
METHODOLOGY

Study 3

- Experimental design
- Treatment → Video that generates anxiety
- Choice experiment

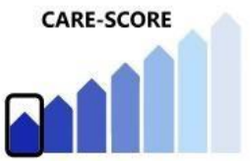
	Attributes		
	Carefulness	**Colour**	**Organic**
Level	Careful	Monochromatic colour bar	Organic
	Less careful	Multi-color bar	Non-organic

Careful option



Careful option

Less careful option



Less careful option

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METHODOLOGY

Study 3

- Experimental design
- Treatment → Video that generates anxiety
- Choice experiment → D-efficient approach
- Task: 64 participants were asked to select their preferred product according to the organic label presence and the "carefulness processing" scale displayed in monochromatic or color.
- Two products:
  - Cow milk
  - Orange juice.

NONE

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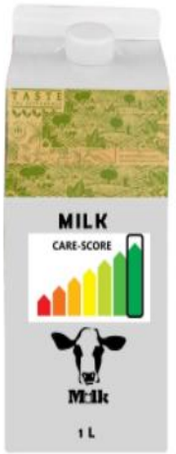
Anxiety does not appear to significantly influence the way consumers choose among food products with different levels of "carefulness"

66% of respondents were regular organic consumers



NONE

Anxious participants tend to prefer organic products over careful

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CONCLUSIONS

Figure. *Colour Based Care-Score*

- Organic food is perceived as less risky by consumers, no matter the processing method applied (study 2).
- The influence of emotions (i.e., induced anxiety) on organic consumers was not found to significantly affect consumers' preferences on different processing technologies/methods nor the consumers' perceived level of carefulness of these methods (study 2 &3)
- The working definition of organic 'careful processing' and the colour-based care-score label that were developed in this study may be useful as a starting point to communicate organic food processing on the label (study 1, 2, 3)

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Part III

Claudia Meier

FIBL Schweiz

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Consumer preferences for milk processing – a segmentation approach

Biofach eSPECIAL 2021
18.02.2021

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Hanna Stolz, FiBL
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Background

- Overall goal:
  - Identify strategies and tools for communicating organic food processing to consumers.
- Goal of this study:
  - Identify different groups of consumers with different preferences for processing as a basis for targeted consumer information and communication.
  - Example product: milk

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Data collection

- Method of data collection: Online survey
- Population of interest: Milk consumers living in Germany and the German speaking part of Switzerland.
- Eligibility criteria:
  - Live in a milk consuming household
  - 18 to 75 years old
  - Fully/ partially responsible for food shopping
- Sample size:
  - 600 consumers in Germany
  - 687 consumers in German speaking Switzerland

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Method to elicit consumer preferences

- Simple ranking task:
  - «Choose the 6 most important purchasing criteria for milk from a given set of 12 purchasing criteria and rank them according to their importance from 1 – most important – to 6 – least important.»

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Milk purchasing criteria

- Price
- Production system (organic vs. not-organic)
- Region of origin
- Country of origin
- Processing
- Fat content
- Shelf-life
- Taste
- Freshness
- Nutritional value
- Brand
- Packaging

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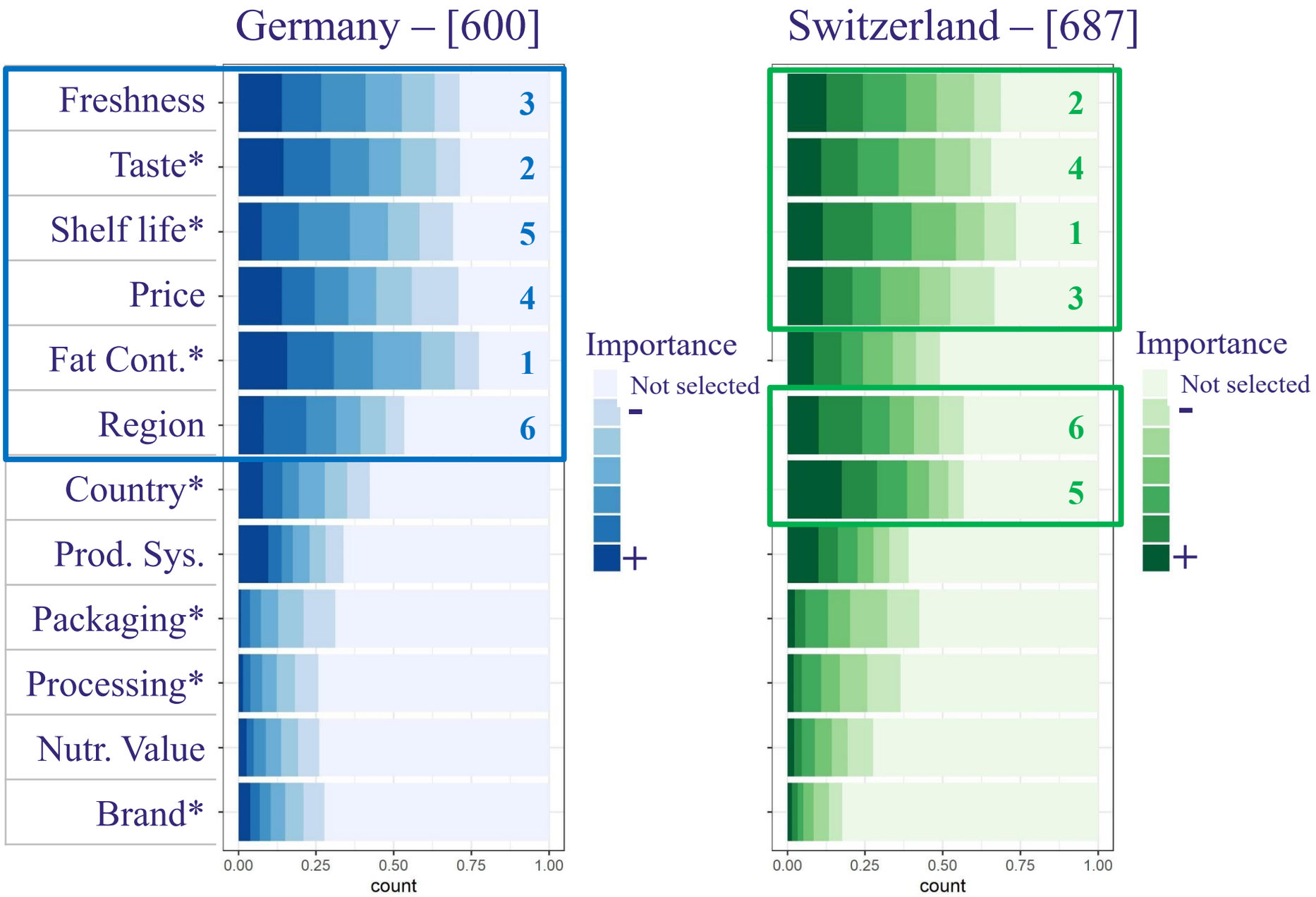
Importance of purchasing criteria by country



*: significant difference between the countries

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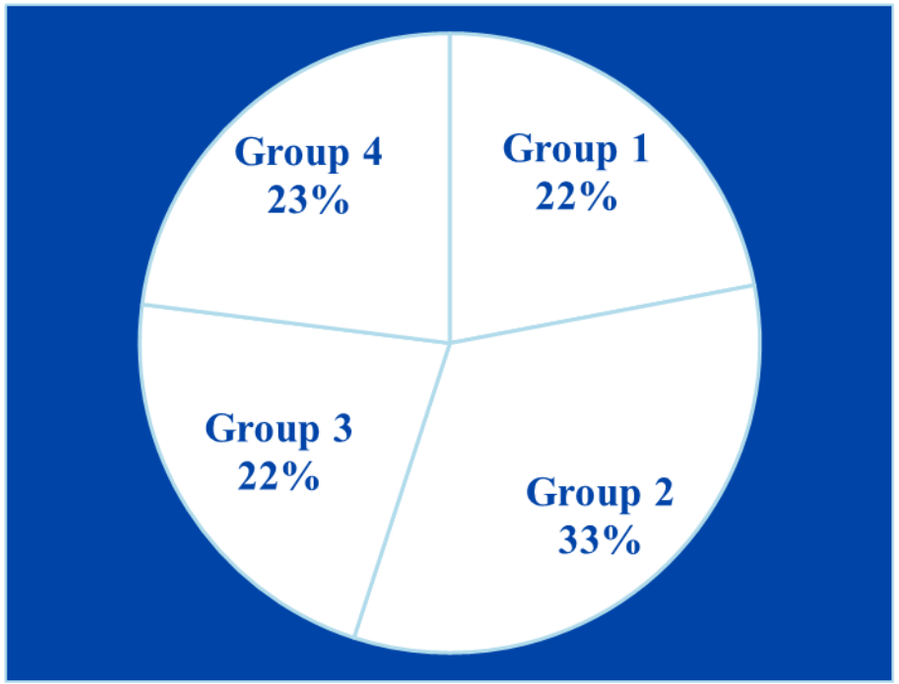
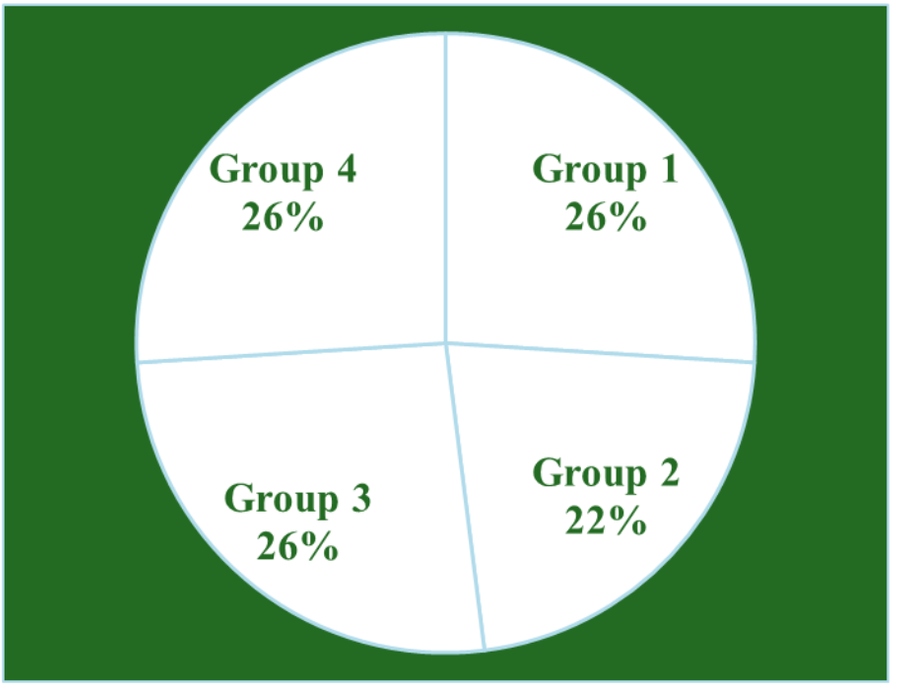
Four distinct consumer groups

Germany – [600]



Switzerland – [687]



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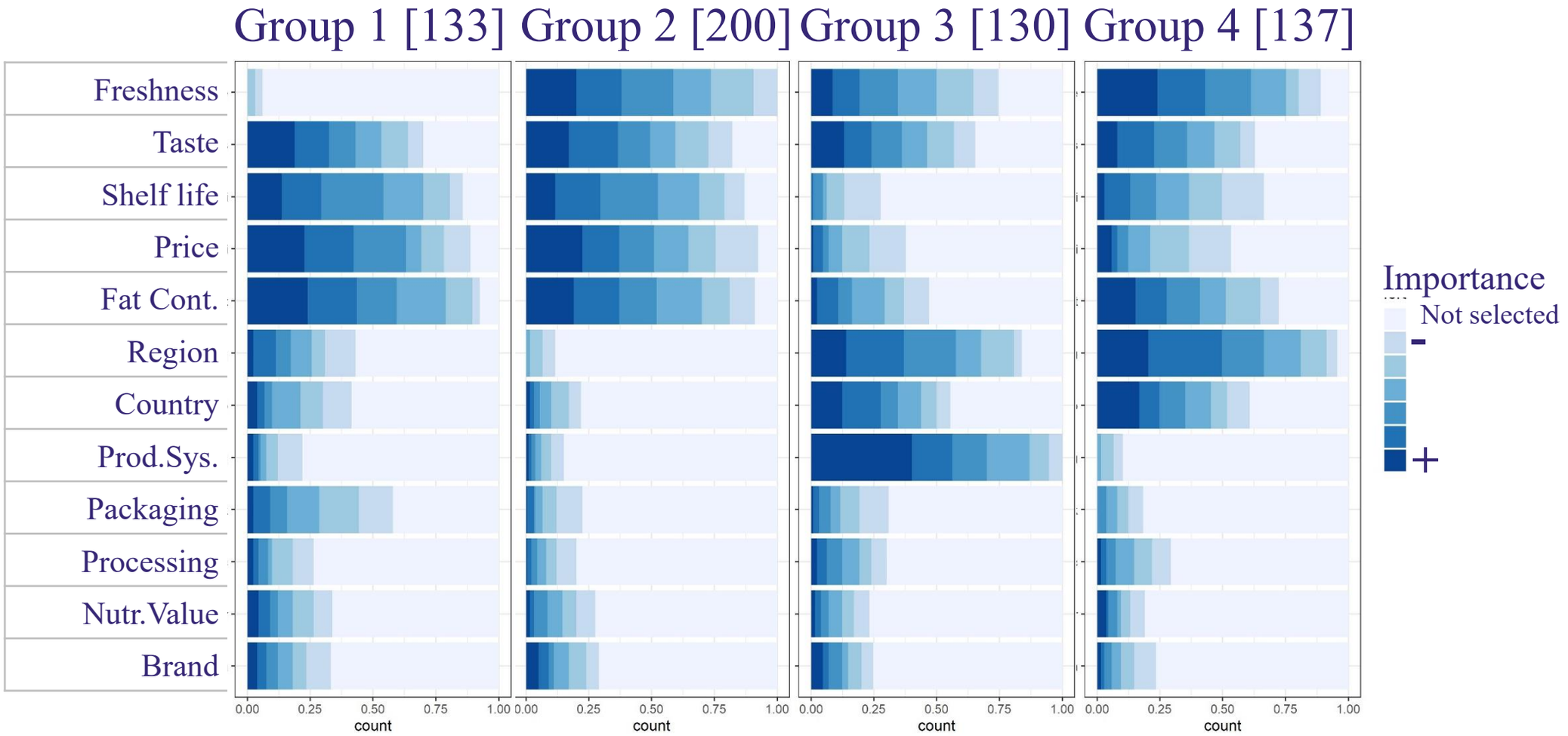
Germany: Importance of purchasing criteria by consumer group



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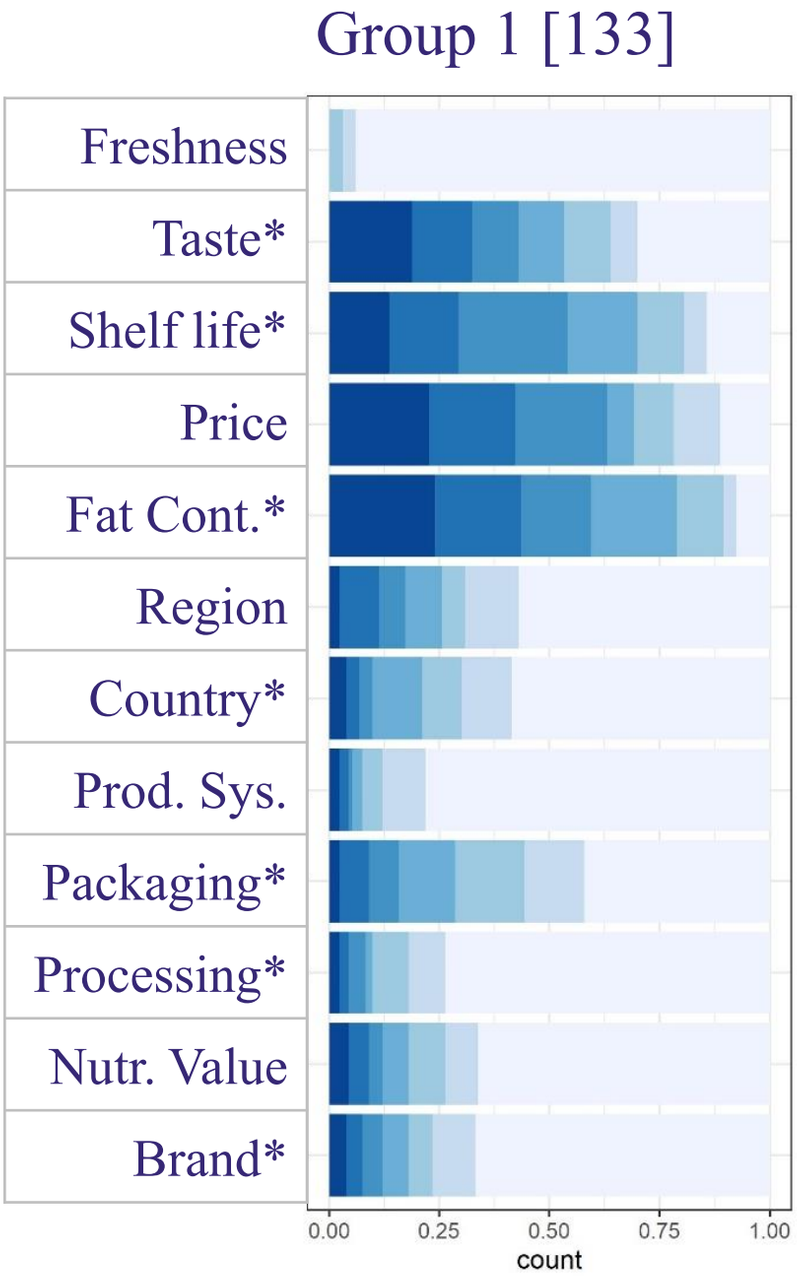
Germany – Group 1: «Convenience seekers»



- **Milk purchasing criteria**
  - Very low importance of freshness, very high importance of fat content, price, and shelf life
  - High importance of taste
  - Relatively high importance of packaging
  - Low importance of region of origin and production system
- **Sociodemographics**:
  - 45 years old (average: 51 years old)
  - 45% male/ 55% female (average: 49% male/51% fem)
  - Income = sample average
- **Milk consumption**
  - 3% raw milk/17% past milk/80% UHT milk
- **Organic consumption frequency**
  - Value of 4 = occasionally (average: 4)
- **WTP more for carefully processed food**
  - Value of 5 = Rather agree (average: 5)

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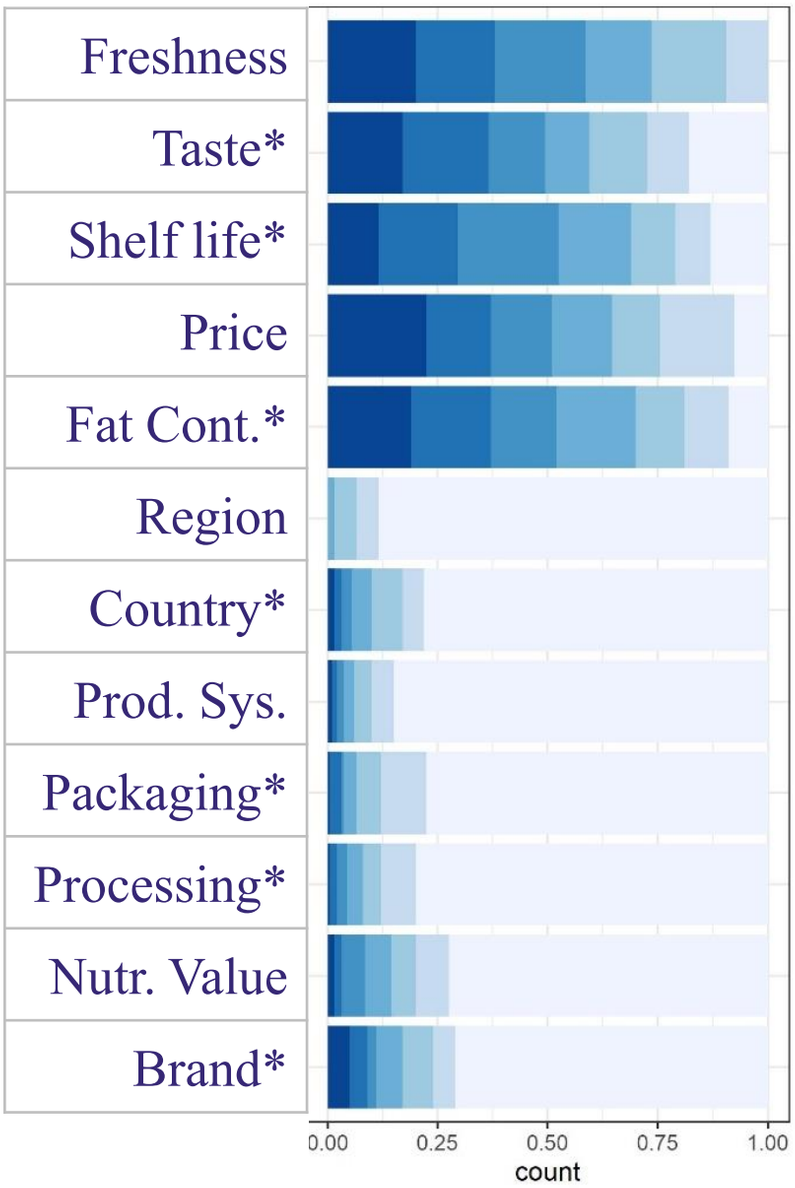
Germany – Group 2: «Quality seekers»

Group 2 [200]



- **Milk purchasing criteria**
  - Very high importance of freshness, price, fat content, shelf life, and taste
  - Very low importance of region of origin and production system
- **Sociodemographics**:
  - 51 years old (average: 51 years old)
  - 56% male/ 44% female (average: 49% male/51% fem)
  - Income = sample average
- **Milk consumption**
  - 2% raw milk/38% past milk/60% UHT milk
- **Organic consumption frequency**
  - Value of 3 = rather seldom (average: 4)
- **WTP more for carefully processed food**
  - Value of 5 = Rather agree (average: 5)

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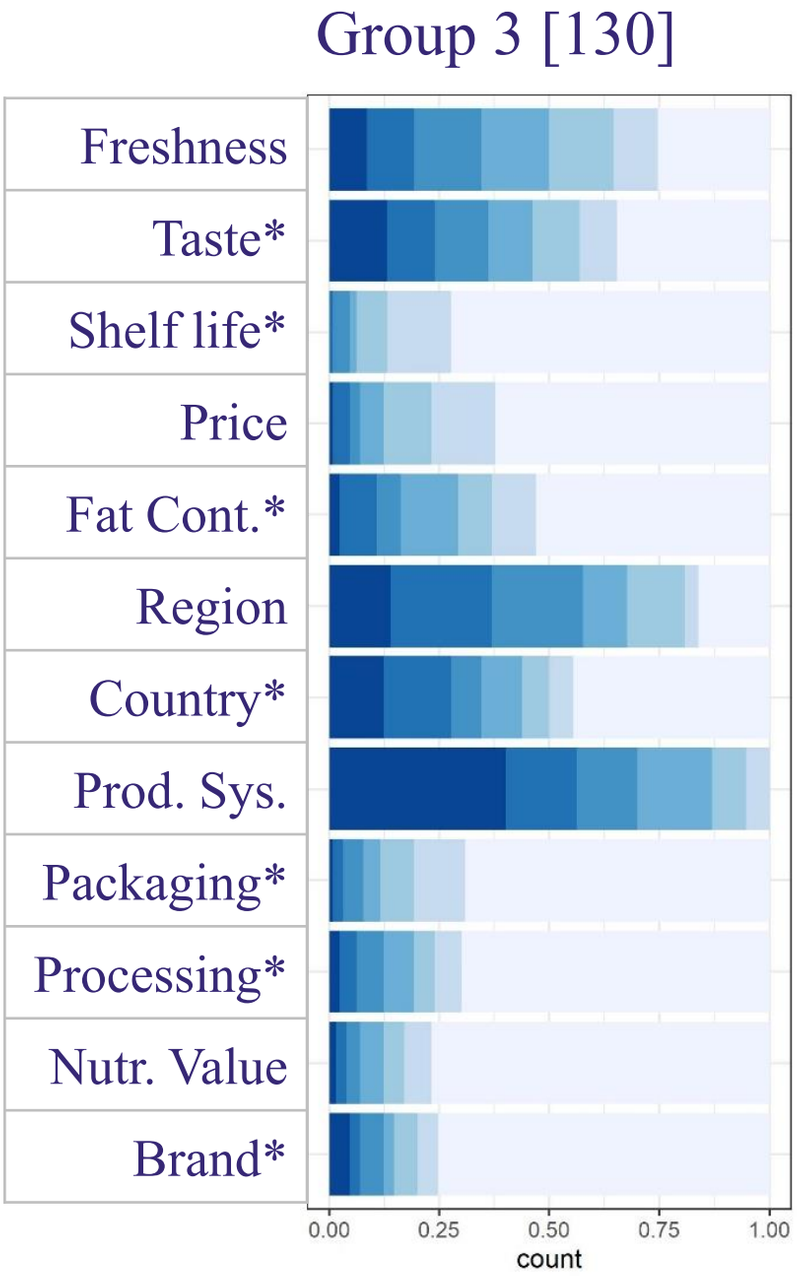
Germany – Group 3: «Organics»



- **Milk purchasing criteria**
  - Very high importance of production system and region of origin
  - High importance of freshness and taste
  - Lowest importance of shelf life and price
- **Sociodemographics**:
  - 51 years old (average: 51 years old)
  - 45% male/ 55% female (average: 49% male/51% fem)
  - Income above average
- **Milk consumption**
  - **10% raw milk**/52% past milk/38% UHT milk
- **Organic consumption frequency**
  - Value of 6 = very often (average: 4)
- **WTP more for carefully processed food**
  - Value of 7 = fully agree (average: 5)

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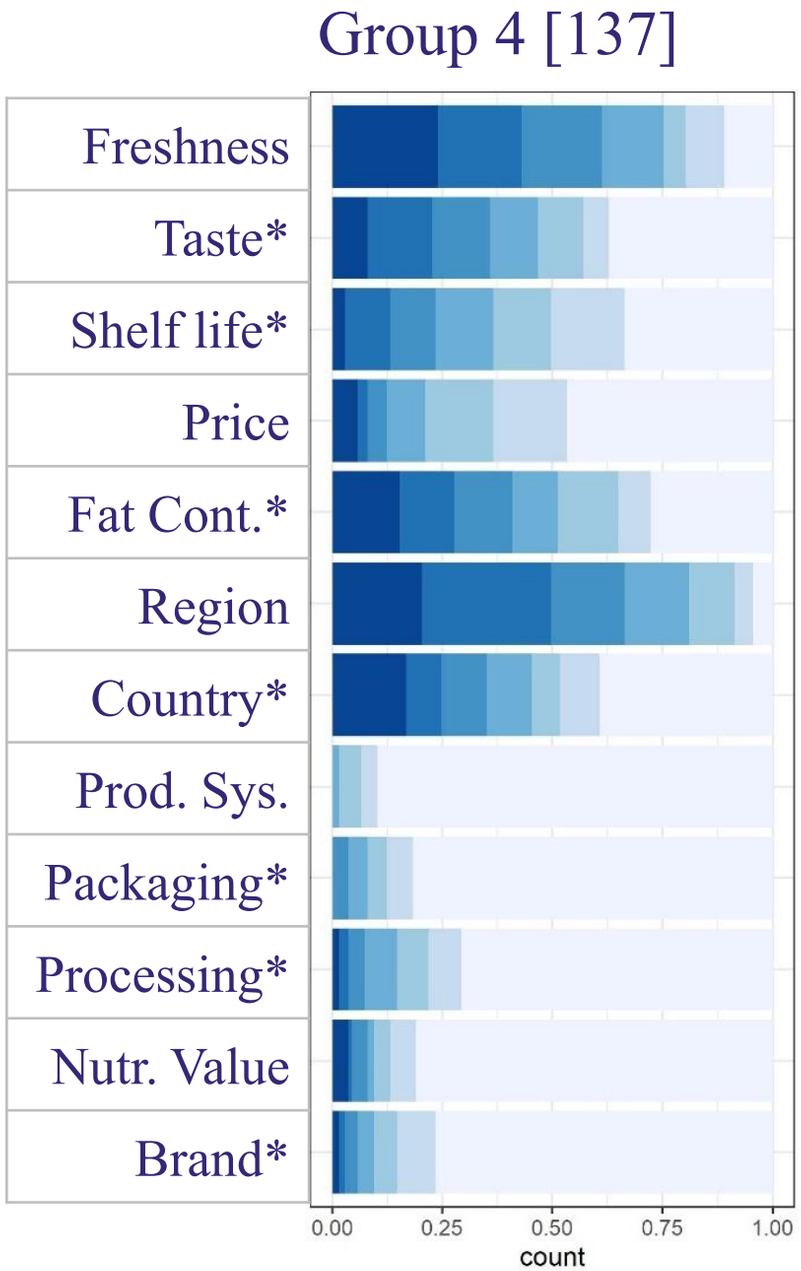
Germany – Group 4: «Origin seekers»



- **Milk purchasing criteria**
  - Very high importance of region of origin and freshness
  - High importance of country of origin, fat content, taste, and shelf life
  - Relatively low importance of price
  - Very low importance of production system
- **Sociodemographics**:
  - 57 years old (average: 51 years old)
  - 46% male/ 54% female (average: 49% male/51% fem)
  - Income above average
- **Milk consumption**
  - 3% raw milk/36% past milk/61% UHT milk
- **Organic consumption frequency**
  - Value of 4 = occasionally (average: 4)
- **WTP more for carefully processed food**
  - Value of 5 = Rather agree (average: 5)

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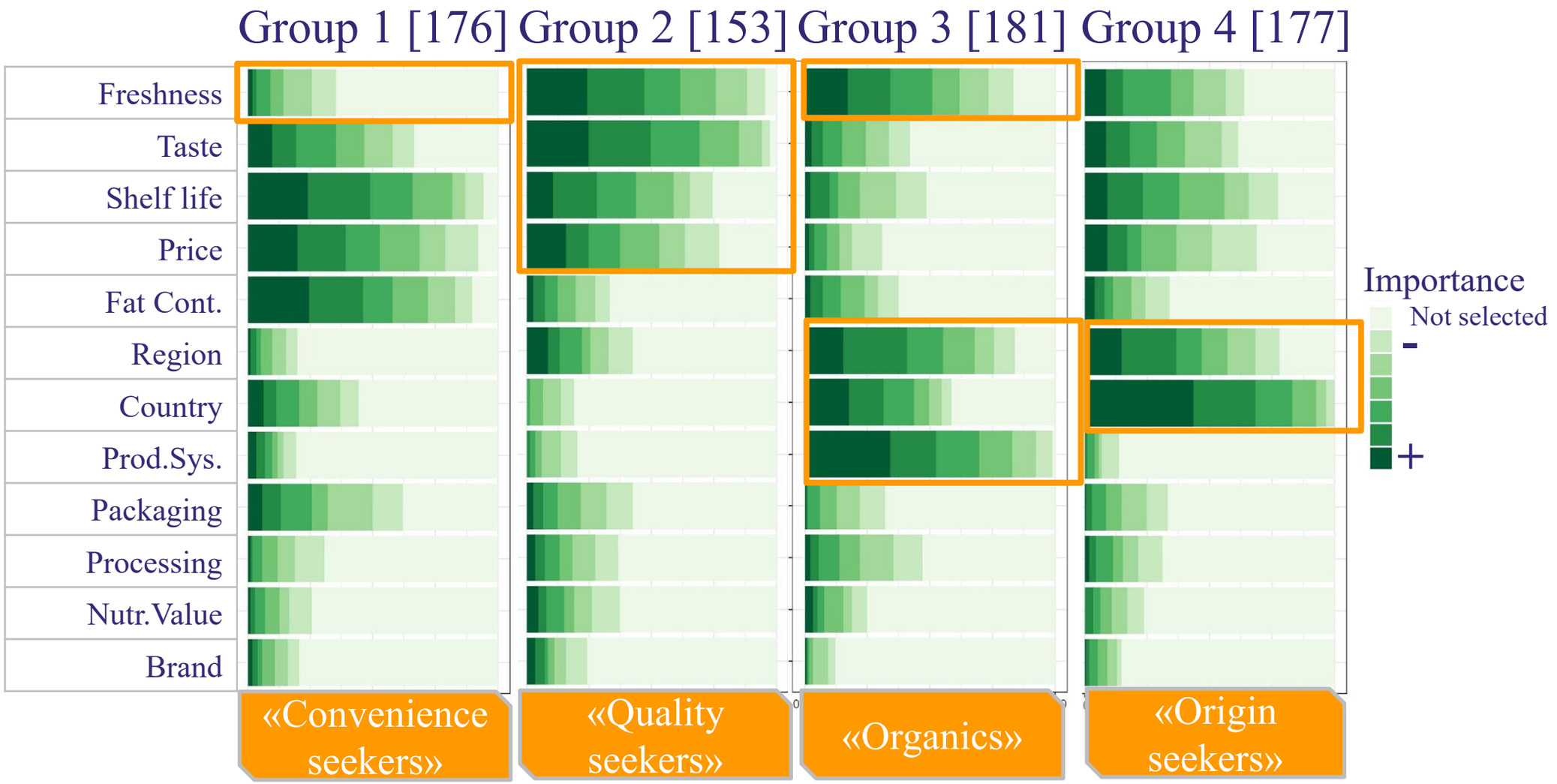
Switzerland: Importance of purchasing criteria by consumer group



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Conclusions (1/2)

- Consumer preferences for milk processing are very similar in Germany and Switzerland, both on country level and on the level of the four consumer groups identified. Only the attribute 'fat content' plays a much more important role in Germany.
- However, consumer preferences for milk processing are very heterogeneous across consumer groups:
  - «Convenience seekers» seem to have the highest and «Organics» the lowest acceptance for a high degree of processing.
  - «Quality seekers» and «Origin seekers» seem to choose between a high or low degree of processing, depending on how they use the milk.

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Conclusions (2/2)

- Consumer groups also differ with respect to the importance of price, region/country of origin, and production system.
  - «Convenience seekers» and «Quality seekers» are most price sensitive. The attributes region/country of origin and production system are of low importance for them. → tend to have a higher budget constraint than the other two groups.
  - For «Organics» and «Origin seekers» the region/country of origin plays a very important role.
  - «Organics» are the only segment where the production system is a very important purchase criterion. → highest organic consumption frequency; highest willingness to pay for careful processing.

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Questions ?

Please use the chat

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